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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/797,661

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Kei Hiruma

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EXAMINER

SCHUCHTER, ANDREW M

ART UNIT

PAPER NUMBER

2871

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/19/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/797,661

Applicant(s)

HIRUMA, KEI

Examiner

Andrew Schechter

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-22, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-22, 27 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/19/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8 November 2006 has been entered.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

In response to the request for a recommended title [p. 5], the examiner defers suggesting a title until it becomes clear what the distinguishing features of the allowed claims are.

Response to Arguments

3. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410, and further in view of *Hashizume et al.*, US 2002/0062787.

Considering claim 20, *Hsieh* discloses [see Fig. 3E, for instance] a liquid crystal arrangement device comprising a discharge unit for discharging liquid crystal [170] to arrange the liquid crystal on a substrate [100], and the discharge unit comprising a plurality of nozzles which discharge liquid crystal in a form of liquid droplets. *Hsieh* does not disclose that there is a controller that controls an interval between the liquid crystal discharged from the nozzles based on a diameter of the liquid droplets after impact of the liquid droplets on the substrate, which was measured in advance. This has two parts: the controller, and what is considered when determining the arrangement pitch of the liquid droplets.

Yamamoto discloses [see Fig. 7] having the nozzles move along the substrate at a certain rate; this inherently requires a controller which controls the rate and thus the interval between the droplets. *Yamamoto* also teaches [see Fig. 7] that when using an ink-jet/nozzle technique, the diameter of the liquid droplets after impact of the liquid droplets on the substrate should be considered, since having droplets too far apart [as

in Fig. 7b] leads to separated droplets on the substrate and an uneven coverage of the substrate, for instance. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a method in which an interval between the liquid droplets is determined based on a diameter of the liquid droplets after impact on the substrate, which would have to be measured in advance (or the teaching could not be applied).

Hsieh also does not disclose a weight measurement device which measures a weight of the single liquid droplet, and the discharge unit discharging the liquid droplets from the nozzles such that each of the liquid droplets has said weight and maintains the interval. *Hashizumi* discloses [see paragraphs 0103-0104, for instance] an analogous discharge unit with a weight measurement device [54] which measures a weight of the single liquid droplet, enabling the discharge unit to discharge the liquid droplets from the nozzles such that each of the liquid droplets has said weight and maintains the interval. It would have been obvious to one of ordinary skill in the art at the time of the invention to have such a weight measurement device, motivated by the teaching of *Hashizumi* that this allows the drop sizes to be constant, despite environmental (or other) changes during the processing.

Claim 20 is therefore unpatentable.

The use of the arrangement device discussed above results in the method recited in claim 16, determining an arrangement pitch of the liquid droplets to be arranged in line [left to right in Fig. 7 of *Yamamoto*], with the interval determined as recited, measuring the weight of the droplet for obtaining the desired diameter, and

discharging the liquid droplets from nozzles while maintaining the arrangement pitch, so claim 16 is also unpatentable.

The arrangement pitch, as seen from *Yamamoto*, is a result-effective variable whose optimization would have been obvious to one of ordinary skill in the art at the time of the invention. Furthermore, *Yamamoto* teaches having it be roughly equal to the diameter of the liquid droplets after impact (to obtain even coverage over the substrate). Claim 17 is therefore unpatentable. This applies similarly to the interval between the nozzles in order to obtain the proper coverage in the perpendicular direction, so claim 21 is also unpatentable.

Hsieh discloses a plurality of pixel regions composed of a plurality of pixels on the substrate and coating the liquid droplets onto each of the plurality of pixel regions, so claim 18 is also unpatentable. The interval between the nozzles and the arrangement pitch of the liquid droplets in *Hsieh* appears to be roughly equal to the arrangement pitch of the plurality of pixel regions; whether it is or not, as discussed above this is a result-effective variable whose optimization would have been obvious to one of ordinary skill in the art at the time of the invention; it would therefore have been obvious to one of ordinary skill in the art at the time of the invention to optimize it to be roughly equal to the diameter of the liquid droplets after impact, so claim 19 is also unpatentable.

Hsieh discloses a plurality of pixel regions arranged on the substrate, and appears to disclose aligning each impact location of the liquid droplets with each location of the pixel regions (if not, this would have been an obvious matter of

optimization as discussed above). However, *Hsieh* does not disclose a drive system for moving the nozzle and the substrate relative to each other (*Hsieh* shows only a cross-sectional slice of its device, and is silent on how the entire substrate is covered).

Yamamoto discloses [see Figs. 6 and 7, for instance] an inkjet device with a plurality of nozzles [Fig. 6] as shown in *Hsieh*, which covers the entire substrate by being moved by a drive system [inherent in Fig. 7]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use such a drive system in the device of *Hsieh*, motivated by the desire to use a single small set of nozzles to efficiently and flexibly cover substrates of varying sizes. Claim 22 is therefore unpatentable.

6. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410 and *Hashizume et al.*, US 2002/0062787 as applied above, and further in view of *Yamamoto et al.*, US 2004/0201818.

Yamamoto '818 discloses [see Fig. 5] a ink-jet nozzle system in which the nozzles are controllable (by a controller). It would have been obvious to one of ordinary skill in the art at the time of the invention to use such an ink-jet system, motivated by the desirability of being able to control the nozzles to turn on and off.

In the device and method discussed above, liquid is dropped from all the nozzles shown in *Hsieh* and *Yamamoto*; alternatively stated, the arrangement pitch is obtained by selecting all the nozzles, and the nozzles have a pitch equal to the arrangement pitch. Similarly, the controller controls the interval in part by selecting all the nozzles, as well as in part by selecting the drive speed. [The examiner notes that the claims do not

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explicitly require the selection of a subset of the plurality of nozzles.] Claims 27 and 28 are therefore unpatentable.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 2002/0081503 to *Kawase et al.* also discloses a weight measurement device [78 in Fig. 9] for measuring the weight of a single liquid droplet in a system for discharging liquid onto a substrate through an ink-jet nozzle system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Andrew Schechter
Primary Examiner
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15 January 2007